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OSPREY AGRIDRONE SOLUTIONS SAFETY RISK MANAGEMENT (SRM) CASE FOR NO VISUAL OBSERVER (VO)

PURPOSE

The following Safety Risk Management (SRM) case is submitted as part of the mitigations Osprey Agridrone Solutions will incorporate during operations under their approved exemption, Exemption No. 19054.

This SRM is triggered because of condition and limitation number 8 listed within Osprey Agridrone Solutions's Exemption No. 19054.

Condition and Limitation Number 8 states that:

8. *"All operations must utilize the services of at least one or more visual observers (VO). The VO must be trained in accordance with Osprey Agridrone Solutions's training program. For purposes of this condition, a VO is someone: (1) who maintains effective communication with the PIC at all times; (2) who the PIC ensures is able to see the unmanned aircraft with human vision as described in Condition and Limitation No. 5; and (3) coordinates with the PIC to scan the airspace where the unmanned aircraft (UA) is operating for any potential collision hazard and maintain awareness of the position of the UA through direct visual observation. The aircraft must be operated within VLOS of both the PIC and VO at all times. The operation must be conducted with a dedicated VO who has no collateral duties and is not the PIC during the flight. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The VO must maintain visual sight of the aircraft at all times during flight operations without distraction. The PIC must ensure that the VO can perform the duties required of the VO. If either the PIC or a VO is unable to maintain VLOS with the UA during flight, the entire flight operation must be terminated as soon as practicable".*

Osprey Agridrone Solutions is asking for relief from this condition and limitation for single aircraft operations because it is not necessary for the type of agricultural operations Osprey Agridrone Solutions is conducting. The visual observer requirement currently does not apply to under 55 lb. aircraft operations performing the exact same functions and their COAs permit higher flight at a maximum altitude of 400 feet as opposed to over 55 lbs. which are restricted to 200 feet.

Overall, the VO requirement for over 55lb. aircraft, specifically in agriculture, is arbitrary and capricious based on an unsubstantiated weight adopted from decades old AMA guidelines. While the use of a VO in other higher 55 lb. operations might be justified, such is not the case in agricultural spraying operations like the ones conducted by Osprey Agridrone Solutions. Osprey Agridrone Solutions's altitude routinely does not exceed 10 feet AGL. That is the height of a regulation basketball hoop, to put this in perspective.

There is no reason for a VO to be present to scan the airspace because the aircraft is basically directly in front of the PIC at all times and the PIC is continuously maintaining VLOS. Additionally, many times agricultural operations are one farmer operations.

The altitude alone in Osprey Agridrone Solutions's operations is a mitigation because no other aircraft are operating at those altitudes, thus eliminating any potential collision hazard.

The redundant features of the DJI products Osprey Agridrone Solutions is utilizing provides an additional level of safety with 360-degree radar, obstacle avoidance, and Geo-fencing.

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The following is a list of potential hazards identified to substantiate their request for relief of Number 8. These mitigations are in addition to Osprey Agridrone Solutions current SMS Program (included with the Petition for Exemption), supported by various levels of policies and procedures that underline safety protocols throughout the company

PROXIMITY AND RISK MANAGEMENT

Osprey Agridrone Solutions will be employing two different methods of protecting persons in vehicles within or around the operations area, based upon a containment method and a probabilistic method. Both will be employed together in determining mitigations and control measures.

- Containment method will be within already low density remote sterile airspace and will include mitigations such as enhanced equipment and software, altitude, propulsion restrictions, geofencing, obstacle avoidance, and geographical alignment, the overall goal in containment methodology is to contain 100% of the UAS failure debris within this controlled area in the event a mishap occurs.
- Probabilistic Risk Assessment (PRA) is the process by which probability and severity of the hazards are defined for a specific operation. This results in a subjective expression of risk and is a structured and logical analysis aimed at identifying and assessing risks in complex technological systems. For example, the purpose of a PRA might include identifying and assessing Near Mid-Air Collision (NMAC) risk. The results provide an estimate of mission outcome likelihood and encounter probability with casualty expectation with other users of the airspace while the UAS is flying in a particular volume of airspace. Based on available design data, the process could identify major risk contributors rather than all possible risk contributors and apply estimates for those major hazard likelihoods to a set of scenarios. An example of an objective would be to estimate the probability that the UAS would successfully transit the proposed volume of airspace without encountering a vehicle at the same time within a pre-determined criteria. The PRA process would use operational and functional system performance estimates, and their associated hazards, to evaluate the ability to mitigate risk.

SAFETY RISK MANAGEMENT ANALYSIS

An analysis of each of the hazards and outcomes identified in the chart below is provided in the following format with controls in accordance (IAW) FAA Order 8040.4 (as amended) and FAA Order 8040.6 (as amended) and provides information pertaining to each of the following elements of the operation along with strategic and tactical mitigations.

- I. Aircraft
- II. Airman/Operator
- III. Airspace/Operating environment
- IV. Emergency Procedures

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Identify Hazards and Outcomes

Hazard Identified	Hazard Definition	Potential Causes	Existing Controls	Possible Outcomes
Technical Issue with UAS	Malfunction of a technical component of the UAS, which causes a deviation from planned operations.	<ul style="list-style-type: none"> • Motor failure • Software failure • Lost Link • GPS Failure • Battery failure • UA leaves planned route • UA leaves established setback boundaries 	<ul style="list-style-type: none"> • Redundant flight controls • Onboard D-RTK • Competent PIC and flight crew trained and current in abnormal and emergency situations • Emergency procedures in place and validated • Lost-link safety default feature allows the UAS to automatically hover and land in response to a lost-link event. • Failsafe RTH • UAS maintained IAW all manufacturer maintenance procedures and remains in a flight ready condition • Preflight checks of UAS for every mission • UAS manufactured by competent or proven entity • Restricted by speed; reduced kinetic energy • Restricted by altitude • Operations over rural uninhabited, private or restricted-access land • Intelligent flight battery with reserve battery power • DBF Imaging Radar • Flight limits and Geofencing zones • PIC required to give way to all other manned aircraft • Lateral setback boundary established to contain debris 	<ul style="list-style-type: none"> • Collision between UAS and a manned aircraft in the air • Collision between a UAS and person on ground or moving vehicle • Collision between a UAS and critical infrastructure on the ground
Deterioration of external systems supporting the UAS operation	Malfunction of any component that is not a part of the UAS but supports safe operations.	<ul style="list-style-type: none"> • GPS signal degradation • Ground station Malfunction • Communication malfunction between PIC and VO 	<ul style="list-style-type: none"> • Built in signal redundancies • Smart and failsafe RTH features • Manual override control features • GPS warning/indicator lights • PIC will follow the procedures outlined in the aircraft operator's manual for GPS failure • UAS is designed to manage the deterioration of external systems supporting the UAS operation • Cellular Phone, voice actuated headsets, Hand signals • If communication is lost and cannot be re-established within 3 seconds 	<ul style="list-style-type: none"> • Collision between UAS and a manned aircraft in the air • Collision between a UAS and person on ground or moving vehicle • Collision between a UAS and critical infrastructure on the ground

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			<p>the PIC will immediately land the UAS.</p> <ul style="list-style-type: none"> • PIC will and give way to all manned aviation operation and activities, at all times 	
Human Error (Human Factor)	A person's mistake rather than the failure of a machine, causing a deviation from planned operations.	<ul style="list-style-type: none"> • Pilot error • Maintenance Errors • Preflight Planning Errors • Mission and route planning errors • Flight into unplanned weather 	<ul style="list-style-type: none"> • All crewmembers are trained and current with complete knowledge of the regulations, limitations, restrictions under which they operate as a Part 107 certified remote pilot and Part 137 certified agricultural operator. • UAS maintained IAW manufacturer procedures and remain in a flight ready condition at all times • Preflight procedures in place and validated • Crew fit to operate – comply with drug and alcohol provisions of §§91.17 and 91.19 • Automated protection of the flight envelope from human error • Crew resource management IAW FAA AC 120-51, or accepted equivalent adhered to • Sterile cockpit procedures adhered to • Flights in VMC conditions only • Failsafe RTH feature 	<ul style="list-style-type: none"> • Collision between UAS and a manned aircraft in the air • Collision between a UAS and person on ground or moving vehicle • Collision between a UAS and critical infrastructure on the ground
Adverse Operating Conditions	Operating into or within conditions that the UAS wasn't intended to, which causes a deviation from planned operations.	<ul style="list-style-type: none"> • Un-forecasted weather • Reduced visibility • Climate and topography unique weather 	<ul style="list-style-type: none"> • Operations in VMC conditions with at least 3 miles visibility and 1500-foot ceiling adhered to • The PIC trained to identify critical environmental conditions and to avoid them • Environmental conditions for safe operations are defined, measurable and adhered to • UAS designed and qualified for adverse environmental conditions • PIC will always give way to all manned aviation operation and activities. 	<ul style="list-style-type: none"> • Collision between UAS and a manned aircraft in the air • Collision between a UAS and person on ground or moving vehicle • Collision between a UAS and critical infrastructure on the ground

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Unable to Maintain VLOS	Inability to maintain VLOS with the UAS causing a deviation from planned operations.	<ul style="list-style-type: none"> • Communication failure between VOs • Traffic conflicts; helicopter routes/uncharted landing surfaces • Inability to comply with 14 CFR Parts §91.113 and §107.37 • Unexpected Low altitude General Aviation (GA) Operations 	<ul style="list-style-type: none"> • Effective continuous communications between PIC and UA • PIC properly trained in 14 CFR Parts 91.113 and 107.37 • PIC positioned at visual vantage points in the operations area • Time of day operating restrictions • Restricting operations within certain boundaries or airspace volumes • Restricting operational flight time • Altitude restricted • Low altitude and proximity to certain structures; prohibits manned flights • Flight termination in the event the PIC is unable to maintain VLOS with the UAS during flight • PIC will and give way to all manned aviation operation and activities, at all times 	<ul style="list-style-type: none"> • Collision between UAS and a manned aircraft in the air
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I. AIRCRAFT

A. AIRCRAFT SAFETY FEATURES

1. Initial Airworthiness Review

In additional to the FOPM, all UAS operations will be conducted in accordance with (IAW) the DJI operating manuals. Aircraft will be operated in a flight ready condition at all times and aviation personnel are expected to utilize sound, conservative judgment in their approach to their duties.

In accordance with the statutory criteria provided in 14 CFR part 107, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, Osprey Agridrone Solutions expects no adverse safety affects to participating or nonparticipating individuals compared to a manned aircraft that holds a standard airworthiness certificate performing a similar operation.

In addition, Osprey Agridrone Solutions has an established inspection and maintenance program for the continued airworthiness of the aircraft in accordance with the manufacture's maintenance, overhaul, replacement, inspection and life limit requirements for the aircraft and aircraft components.

2. Redundant Flight Controls

DJI Aircraft have an aerial-electronics system with a multiple redundancy design, and also has onboard D-RTK antennas, supporting dual-antenna technology that provides strong resistance against magnetic interference to ensure flight safety. The dedicated DJI industrial flight control system, offers four operation modes: Route, A-B Route, Manual, and Manual Plus. DJI MG2 automatically produces flight routes based on planned fields to ensure the aircraft remains inside pre-programmed mission areas.

- a. **Signal Redundancies:** The all-new modular aerial-electronics system in DJI products has dual IMUs and barometers and adopts a propulsion signal redundancy design to ensure flight safety. The GNSS+RTK dual-redundancy system supports centimeter-level positioning. It also supports dual-antenna technology that provides strong resistance against magnetic interference.
- b. **Onboard Radar:** The Spherical Radar System consists of the Omnidirectional Digital Radar and Upward Radar, providing altitude detection and stabilization in forward, backward, and downward directions as well as obstacle sensing in all horizontal directions and upward direction when in Route, A-B Route, and Manual Plus operation modes. This is especially important during

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operations with no visual observer. This feature allows the aircraft to maintain its own situational awareness with real time obstacle avoidance. The radar can detect the angle of a slope and automatically adjust to maintain the same distance with the surface even in mountainous terrain. In Route and A-B Route operation modes, the radar can effectively sense obstacles and plan a route to actively circumvent obstacles.

- c. **P-mode (Positioning):** The aircraft utilizes GNSS or the RTK module for positioning. When the GNSS signal is strong, the aircraft uses GNSS for positioning. When the RTK module is enabled and the differential data transmission is strong, it provides centimeter-level positioning. The aircraft reverts to A-mode when the GNSS signal is weak. The aircraft will fly in P-mode by default.
- d. **Geo Fencing and Obstacle Avoidance:** The UA's flight controller is given GPS coordinates of a boundary that it cannot leave, keeping the UA from leaving the pre-determined and defined operations area. When enabled, the UA can "hit" the perimeter, but not fly past or through it. Manual or automatic inputs commanding the UA to break the geofence are ignored. In this case where there is a road along the property line, the operator can use the Ground Station Maps interface and draw a line around the field. This is a perimeter that the drone will not fly outside of. If the operator were to try to fly beyond that boundary, the aircraft would approach the line and stop and hover.

Second, for an obstacle, other property, or people, and purposeful obstacle boundary can be established. This means that the aircraft will build its flight plan and avoid that obstacle. Further, the operator can specify how large of a buffer they would like to keep between the aircraft and that obstacle.

When operating with a strong GNSS signal, the height and distance limits and GEO Zones work together to monitor flight. But even with a weak GNSS signal, the height limit prevents the aircraft from going above 30 meters.

As a reminder, if there was ever a time where a non-participant person, property, or unexpected aircraft entered the planned flight area, the operator could also immediately halt the operation by activating the emergency "kill switch" to immediately stop the rotors or may press a switch to activate the emergency return to home feature.

- e. **Return to Home:** There are two types of RTH: Smart RTH and Failsafe RTH.

Smart RTH

When GNSS is available to enable Smart RTH, the speed and altitude of the aircraft can be controlled when returning to the home point. The aircraft status indicators will show the current flight mode during RTH. Press the RTH button once or toggle the pause switch to exit Smart RTH and regain manual control of the aircraft.

Failsafe RTH

Failsafe RTH is automatically activated if the remote controller signal is lost for more than three seconds, provided that the home point has been successfully recorded, and the GNSS signal is strong and the RTK module is able to measure the heading of the aircraft. The RTH continues if the remote controller signal is recovered, and users can control the aircraft using the remote controller.

There are two ways to set a home point:

1. Set the current coordinates of the aircraft as the home point.

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2. Set the current coordinates of the remote controller as the home point.

Obstacle Avoidance During RTH

Obstacle avoidance during RTH is also available. If there is an obstacle Within 20 m of the aircraft, the aircraft decelerates and then stops and hovers. If the aircraft comes within 6 m of the obstacle while decelerating, the aircraft stops, flies backward, to a distance of approximately 6m from the obstacle, and hovers. The aircraft exits the RTH procedure and waits for further commands.

f. DBF Imaging Radar: The all-new DBF imaging radar works during both day and night, without being affected by light or dust. The radar module can predict the distance between the aircraft and the vegetation or other surfaces in forward, rear, and downward directions to fly at a constant distance to ensure even spraying and terrain following capability. The DBF imaging radar can also detect obstacles 30 m away from the aircraft. The radar module adopts digital beam forming technology, which supports 3D point cloud imaging that effectively senses the environment and helps to circumvent obstacles in both Route and A-B Route operation modes. In addition, radar module limits the descent speed of the aircraft according to the distance between the aircraft and ground, to provide a smooth landing.

The altitude stabilization and obstacle avoidance functions of the radar module are enabled by default and the obstacle avoidance function can be used in any mode. Auto Bypass is disabled by default.

G. Reserve Power: The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power to conduct the intended operation with sufficient reserve such that in the event of an emergency, the PIC can land the aircraft in a known area without posing an undue risk to aircraft or people and property on the ground. In the alternative, if the manufacturer's manual, specifications, or other documents that apply to operation recommend a specific volume of reserve power, the PIC will adhere to the manufacturer's recommendation, as long as it allows the aircraft to conduct the operation with sufficient reserve and maintain power to land the aircraft in a known area without presenting undue risks, should an emergency arise.

2600W 4 Channel Intelligent Battery Charger

Up to four batteries can be charged simultaneously. When using the single-channel quick charging mode, a full charge only takes 20 minutes, a 50% increase in speed from the previous generation. The charger has a built-in battery health management system that monitors critical data in real time, such as voltage and temperature, to ensure charging safety.

T-30 Intelligent Flight Battery

The T30 Intelligent Flight Battery has a capacity of 17,500 mAh and a 14S high voltage system that reduces power consumption. It is designed with an IP54-rated all-metal housing, and heat dissipation efficiency has increased by 140% from the previous generation. Supported by cell-balancing technology, the battery has an increased charging cycle of up to 400, 100% higher than the previous generation.

h. Emergency brake and return-to-launch (RTL) - The operator has systems that they can use to instantly stop the UA and return it to the base point at a predetermined safe height, respectively.

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- i. Beacon** - In the extremely unlikely event of a system malfunction that causes a crash, a beacon attached to the UA will help the PIC and ground crew quickly locate it, ensuring a quick response to secure the equipment and surrounding area.
- j. RTK GPS** - The UAS has a telemetry link to a base station which makes GPS corrections, giving the UA an accurate location reading with under 3 feet of precision. (Typically, 50cm). This ensures that the UA is flying the missions it is given and applying herbicides in a pattern much more efficiently and consistently than agricultural helicopters.
- k. Redundant GPS**- All UAS are equipped with redundant GPS units. Should the primary GPS unit experience a failure, a second GPS unit will automatically take over as a failsafe to ensure accurate positioning and navigation is maintained. Full dual redundancy, automatic switching in real-time between compass, IMU, GPS or controller if one fails.
- l. Telemetry** - Should a telemetry link to the base station be lost, the UA has all mission parameters stored onboard, and can safely continue to execute a mission. If the RTK link is dropped, the positioning accuracy may drop to around 3m accuracy. Audio alerts on the RC remote and base station computer will alert the PIC, who may opt to allow the UA to continue its mission if it is safe to do so or interrupt the mission and bring the UA back under RC control.
- m. System Data Protection:** In Route or Route A-B operation mode, the System Data Protection feature enables the aircraft to retain vital system data such as operation progress and breakpoints after the aircraft is powered off to replace a battery or refill the spray tank.

During Route operations, in situations when the remote controller disconnects from the aircraft, the breakpoint will be recorded by the flight controller and can be recovered in the app once the aircraft is reconnected.

3. Speed Restrictions

- a. Restricted by Speed:** The aircraft generally will not be operated at an airspeed exceeding 25 miles per hour or at an airspeed greater than the maximum operating airspeed recommended by the aircraft manufacturer, whichever is lower. However, in locations approaching the boundary setbacks, aircraft can be reduced to a forward speed of no more than 5 mph in both manual and autonomous modes, or hover when necessary prior to the turn along the setback boundary of the for safety.

II. Airman/Operators

A. Crew Member Roles and Responsibilities

1. Pilot in Command (PIC)

The PIC is the holder of a remote pilot certificate with a UAS rating and satisfies the aeronautical knowledge currency requirements of 107.65.

The PIC is responsible for halting or canceling activity in the operations area if, at any time, the safety of persons or property on the surface or in the air is in jeopardy.

The PIC shall have successfully completed the training and qualification process as specified in the DJI AGRAS User's Manuals. PIC qualification flight hours and currency will be logged in a manner consistent with 14 CFR § 61.51(b). Duties include, but are not limited to:

- checking weather and all applicable NOTAMs where available;

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- determining the aircraft weight and balance IAW payload and airframe requirements;
- ensuring that all flight planning requirements have been met;
- ensuring that the aircraft is duly registered and that the documentation is available for inspection at the Ground Control Station;
- ensuring that aircraft crew members have valid licenses, medical certificates and passports and visas if required, and are qualified for the mission to be flown;
- completing an aircraft pre-flight inspection before each departure;
- briefing the crew members;
- operating the aircraft in accordance with operator procedures and aircraft limitations IAW the aircraft operators manual;
- completing all post flight duties and recording flight times and aircraft defects.

PIC AUTHORITY

The PIC of a flight is directly responsible for, and is the final authority as to the safe, effective, operation of the aircraft and the well-being of the crew (Ref 14 CFR part 91.3). Deviation from specified flight and operating instructions is authorized during an in-flight, emergency situation, when in the judgment of the PIC, safety justifies such action.

Responsibility for starting or continuing flight with respect to weather or any other condition affecting the safety of the aircraft rests with the PIC. The PIC is vested with the final decision regarding the aircraft's airworthiness and safe conduct of the flight. The PIC will always be positioned to observe the aircraft and the surrounding airspace so that The UAS's proximity to other airborne assets (participating and non-participating aircraft) and physical hazards (towers, structures, weather) is always known.

In the case of a mishap to an aircraft, the PIC is responsible for its safe custody until the aircraft has been taken into custody by proper authority IAW National Transportation Safety Board (NTSB) Title 49 Subtitle B Chapter VII Part 830 and all other FAA requirements.

Other Flight Crew

Ancillary personnel such as sensor operators or other specialists must be thoroughly familiar with and possess operational experience of the equipment being utilized in accordance with the operator's manual.

Crew Resource Management

The goal of Osprey Agridrone Solutions UAS program is to provide safe, efficient, consistent, and reliable utilization of aviation assets for the public. The aircrew members and observers are uniquely positioned and qualified to ensure that these goals are met for each and every flight. Experience has shown that a well- managed flight deck/cockpit environment, including the timely and correct exchange of information between crewmembers and the proper accomplishment of their appointed tasks, serves as one of the most effective methods by which operational safety can be enhanced. All UAS crewmembers will be trained in CRM and the PIC will ensure that all aircrew members integrate crew risk management. The current edition of FAA AC 120-51, Crew Resource Management Training, or recognized equivalent, is applicable.

Sterile Cockpit

During critical phases of flight, no crewmember may perform any duties not required for the safe operation of the aircraft. No crewmember may engage in, nor may any PIC permit, any activity during a critical phase of flight, which could distract any crewmember from the performance of his/her duties or interfere in any way with the proper conduct of those duties.

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III. Airspace/Operating Environment

A. Airspace Description

Osprey Agridrone Solutions operations will be conducted within the Contiguous United States, during Visual Meteorological Conditions (VMC) conditions, in Class G uncontrolled airspace only and no portion of the flight will occur in Class B, Class C, or Class D airspace or within the lateral boundaries of the surface area of Class E airspace designated for an airport unless a specific airspace authorization is received through an amended Petition for Exemption approved by the FAA.

1. Notice to Airman (NOTAMs)

The PIC will request a Notice to Airman (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to each operation. The NOTAM will contain the following information:

- Name and address of the pilot filing the NOTAM request.
- b. Location, altitude, and/or operating area.
- c. Time and nature of the activity.
- d. Number of UAS flying in the operating area.

The area of operation defined in the NOTAM will only be for the actual area to be flown for each day and defined by a point and the minimum radius required to conduct the operation.

The PIC will cancel applicable NOTAMs when UAS operations are complete or will not be conducted.

Coordination Requirements

Operators and UAS equipment will meet the requirements (communication, equipment, and clearance) of the class of airspace within which the UA will operate. In this case, it will be class G uncontrolled airspace.

PIC filing and the issuance of required distance (D) NOTAM will serve as advance ATC facility notification for UAS operations in an area.

2. Site Selection and Operational Procedures

Osprey Agridrone Solutions operations will occur in a closed access environment over rural uninhabited, unoccupied, private or restricted-access land. These operating areas will always be owned or managed by the person or entity that is contracting with Osprey Agridrone Solutions to perform the aerial application and will be planned and approved in advance of the mission.

Due to the contractual nature of the operations with landowners, no other manned crop spraying operations will occur during Osprey Agridrone Solutions flight operations. Further, there are areas of airspace associated with UAS agricultural operations where normal manned aircraft cannot fly. However, the PIC will remain clear and give way to any unexpected manned aviation operations and will immediately land the UAS until the manned aircraft has exited the operations area.

Operational Obstacles and Boundaries

Prior to conducting flight operations, the PIC will identify any operational area obstacles and boundaries, so to avoid collision with, or damage to property. Osprey Agridrone Solutions will visit the area of planned operation and inspect the terrain and vantage points prior to operations. Osprey Agridrone Solutions utilizes a number of tools available to capture this environmental data, including

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high-resolution photogrammetry, and handheld surveying tools. The result is a geo-rectified model of the unit, with GPS points accurately marking the boundaries of the geofenced flight operating area.

Controlled Access

Osprey Agridrone Solutions operations will occur under strictly controlled conditions in predetermined class G airspace that is, 1) Limited in scope 2) Controlled as to access by mission essential personnel only.

Non-participating Personnel

Restricted physical access, early notifications of proposed flight operations, and perimeter monitoring will be conducted in a manner to restrict access by non-participating personnel. To further ensure the area of operation is clear of all non-Participants and any other potential hazards, prior to beginning agricultural operations, a single UAS will be used to survey and access the operating environment.

All personnel at the site will be controlled by Osprey Agridrone Solutions at the time of flying. The aircraft shall operate from on-site takeoff/landing locations directly next to the PIC. In addition, signage announcing future spraying operations will be posted at the site entrance warning any customer employees or non-Participants that an aerial spraying operation is occurring. This is an industry standard process.

Restricted By Altitude

Osprey Agridrone Solutions's operations will be restricted to an altitude of no more than 10-15 feet AGL. This alone is a mitigation because other manned aircraft are restricted from flying at those altitudes, thus eliminating any potential collision hazard. There is no reason for a VO to scan the airspace because the aircraft is basically right in front of the PIC at that altitude and the PIC is maintaining VLOS at all times. Plus, the the height and distance limits and GEO Zones work together to monitor flight and height limits can be preprogrammed to also establish vertical restrictions.

IV. EMERGENCY PROCEDURES

A. Lost Link

A lost-link safety default feature allows the UAS to automatically hover and land in response to a lost-link event. Safety features such as the GPS warning/indicator lights and speed indicator light provide critical system status information to the pilot.

The Osprey Agridrone Solutions pre-programmed emergency procedures also incorporate contingency plans that address emergency recovery or flight termination of the UAS in the event of unrecoverable system failure. These procedures will normally include Lost Link Points (LLP), Divert/Contingency Points (DCP) and Flight Termination Points (FTP) for each operation.

The PIC will immediately abort the flight operation if unexpected circumstances or emergencies arise that could degrade the safety of persons or property. The PIC will terminate flight operations without causing undue hazard to persons or property in the air or on the ground.

When required, the PIC will also notify local ATC of any in-flight emergency or aircraft accident as soon as practical.

B. Manual Control

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If at any time there is a question that the UAS is no longer flying its programmed mission, the PIC will take manual control of the UAS and return it to the landing zone immediately under manual control. There may be minor problems that do not require emergency assumption of control. In these cases, the PIC can direct an autopilot landing or manually land the aircraft.

C. Lost Communications

1. Loss of Communications between the Observer and the Pilot in Command

Communications between the PIC and VO will be through direct communication when possible. However, when the observer and the PIC are not co-located where verbal communication is possible, the following communication tools will be utilized....

- Hand held Police radio
- Voice actuated headsets
- Cellular phone
- Hand Signals (may be used solely or in conjunction with the communication equipment)

If communication is lost and cannot be re-established the UA will immediately land.

2. Between the UAS and GCS

If there is a temporary loss of control of the UAS due to a lost communication link with the GCS, the UAS will respond to the failsafe mode IAW design specifications established in the aircraft operator's manual. The PIC will perform the procedures identified in the Osprey Agridrone Solutions Flight Operations Procedures Manual (FOPM).

3. GPS Failure

If there is a GPS failure and the returning telemetry from the UAS indicates as such, the PIC will follow the procedures outlined in the aircraft operator's manual.

Hazard	Severity	Likelihood
#1 Technical Issue with UAS	Major 3	Remote C
#2 Deterioration of external systems supporting the UAS operation	Minor 4	Remote C
#3 Human Error	Minor 4	Remote C
#4 Adverse Operating Conditions	Major 3	Remote C
#5 Unable to maintain VLOS	Major 3	Remote C

Assess safety Risks

Hazard	Initial Risk Level	Rationale
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#1 Technical Issue with UAS	Medium (3C)	(e.g., The severity is determined to be Major based that Osprey Agridrone Solutions operations will occur under strictly controlled conditions in predetermined class G airspace that is, 1) Limited in scope 2) Controlled as to access by mission essential personnel only. Due to the contractual nature of the operations with private landowners, no other manned crop spraying operations will occur during Osprey Agridrone Solutions flight operations. Further, there are areas of airspace associated with the UAS operations where normal manned aircraft cannot fly due to the proximity to the ground and potential structures. With the added mitigations in place the likelihood is determined to be extremely remote . The DJI Agras T-30 is equipped with redundant flight controls and transmission systems that are adequate to maintain simultaneous control of the UAS so they remain inside the operations area. Additional sophisticated and effective Geo fencing is also in place for containment and the proven DJI Agras T-30 has logged a combined total of 5,856,935 hours flown without any recorded incidents.
#2 Deterioration of external systems supporting the UAS operation	Low (4C)	The severity is determined to be minor based on the UAS being designed from the manufacturer to manage the deterioration of external systems supporting the UAS operation. With the added mitigations in place, the likelihood is extremely remote . Manual control features allow PIC to immediately return to landing zone and the aircraft is equipped with GPS warning/indicator lights. The PIC will follow the procedures outlined in the aircraft operator's manual for GPS failure and in the event of a communications failure, the PIC will immediately land the UASs.
#3 Human Error	Low (4C)	The severity is determined to be minor based on all crewmember's initial and recurrent training with a complete knowledge of the regulations, limitations, restrictions under which they operate as a Part 107 certified remote pilot and Part 137 certified agricultural operators. UASs will be maintained IAW manufacturer procedures and remain in a flight ready condition. With the added mitigations in place, the likelihood is extremely remote . Team checklists IAW Osprey Agridrone Solutions training manual and the FOPM will be adhered to and all crew members are trained and fully knowledgeable in crew resource management. The Automated features also protects the flight envelope from human error.
#4 Adverse Operating Conditions	Medium (3C)	The severity is determined to be major based the potential for adverse weather conditions during seasonal crop spraying operations. With the added mitigations in place, the likelihood is extremely remote . Operations will occur in VMC conditions only. The PIC and the VOs are trained to identify critical environmental conditions and to avoid them. Environmental conditions for safe operations are defined, measurable and adhered to with up to date weather forecasts and vigilance during flight operations. In the event of a weather degradation event, the PIC will land the aircraft.

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#5 Unable to maintain VLOS	Medium (3C)	The severity is determined to be major . The PIC and VO are properly trained in §§ 91.111, 91.113, and 91.115, and 107.37 and the PIC and VO will be positioned at visual vantage points in the operations area. With the added mitigations in place, the likelihood is extremely remote . Time of day operating restrictions and restricting operations within certain boundaries or airspace volumes minimizes this risk. Operations will be restricted in time and flight termination will occur in the event the PIC or a VO is unable to maintain VLOS with the UAS during flight.

Additional Safety Control and Residual Safety Risk

Hazard	Additional Controls	Severity	Likelihood	Residual Risk Level
#1 Technical Issue with UAS	No flights around other manned aircraft. Emergency procedures in place and validated. Recommendations of the Monte Carlo Model for setback boundaries adhered to.	Major	Extremely Remote	Green (3D)
#2 Deterioration of external systems supporting the UAS operation	If at any time there is a question that the UAS is no longer flying its programmed mission, the PIC will take manual control of the UAS and return it to the landing zone immediately under manual control.	Minor	Extremely Remote	Green (4D)
#3 Human Error	Recurrent human factors training. Pre and post flight briefings and lessons learned.	Minor	Extremely Remote	Green (4D)
#4 Adverse Operating Conditions	UAS designed and qualified for adverse environmental conditions	Major	Extremely Remote	Green (3D)
#5 Unable to maintain VLOS	Corrective lenses, glasses, and contact lens are allowed. Binoculars, telephotos lens, night vision goggles, and field glasses are allowed as augmentation devices. All supported operations will be conducted in VMC.	Major	Extremely Remote	Green (3D)

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Severity Likelihood	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
Frequent A	[Green]	[Yellow]	[Red]	[Red]	[Red]
Probable B	[Green]	[Yellow]	[Yellow]	[Red]	[Red]
Remote C	[Green]	[Green]	[Yellow]	[Yellow]	[Red]
Extremely Remote D	[Green]	[Green]	[Green]	[Yellow]	[Red] [Yellow]
Extremely Improbable E	[Green]	[Green]	[Green]	[Green]	[Yellow]

High Risk [Red]

Medium Risk [Yellow]

Low Risk [Green]

* High Risk with Single Point and/or Common Cause Failures

The completed analysis reflects no residual risk levels of medium or high and in addition to this SRM, all Osprey Agridrone Solutions UAS flight operations will comply with provisions in the FOPM, Aircrew Training Manual, and SMS to assure all current risk controls are valid and adequate.